

- 1 1. An apparatus, comprising a semiconductor polishing device having a first surface  
2 defining at least one non-intersecting fluid retaining groove at least a portion of which is  
3 oriented at an angle relative to a radial line originating at a center of the semiconductor  
4 polishing device, wherein the non-intersecting fluid retaining groove is adapted to flow a  
5 fluid inwardly toward a center portion of the semiconductor polishing device.
- 1 2. The apparatus of claim 1, wherein the semiconductor polishing device is one of a  
2 polishing pad and a platen.
- 1 3. The apparatus of claim 1, wherein the depth of the non-intersecting fluid retaining  
2 groove changes along a length of the non-intersecting fluid retaining groove.
- 1 4. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove has a  
2 first portion and a second portion having a same direction of curvature and defining a  
3 tangent point to the radial line.
- 1 5. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove is  
2 oriented in a direction of rotation moving at an increasing radius from a first end of the  
3 grooves to a second end of the grooves.
- 1 6. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove is  
2 oriented in a direction of rotation moving at an increasing radius along a length of the non-  
3 intersecting fluid retaining groove.
- 1 7. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove is  
2 selected from arcuate grooves, linear grooves, and any combination thereof.
- 1 8. The apparatus of claim 1, wherein the non-intersecting fluid retaining groove  
2 extends from the center portion of the semiconductor polishing device to an edge of the  
3 semiconductor polishing device and wherein no point of the non-intersecting fluid retaining

4 groove is tangent to the radial line.

1 9. The apparatus of claim 1, wherein the semiconductor polishing device is adapted for  
2 use with a rotary polisher.

1 10. The apparatus of claim 1, wherein the semiconductor polishing device is adapted for  
2 use with a linear polisher.

1 11. The apparatus of claim 1, wherein the semiconductor polishing device is a polishing  
2 pad and the first surface is a polishing surface.

1 12. The apparatus of claim 1, wherein the semiconductor polishing device is a platen  
2 and the first surface is a polishing pad mounting surface.

1 13. The apparatus of claim 1, wherein the semiconductor polishing device is a platen  
2 and the first surface is a polishing pad mounting surface having a perforated pad disposed  
3 thereon, wherein a plurality of perforations formed in the perforated pad couple the non-  
4 intersecting fluid retaining groove with a polishing surface of the perforated pad.

1 14. A substrate polishing pad, comprising:  
2 (a) a polishing surface on a first side of the substrate polishing pad; and  
3 (b) a mounting surface on a second side of the substrate polishing pad;  
4 wherein at least one of the polishing surface and the mounting surface has a plurality of  
5 non-intersecting fluid retaining grooves formed therein, wherein the grooves are disposed so  
6 that upon a given direction of movement of the substrate polishing pad a fluid disposed in  
7 the grooves is urged to flow from an outer portion toward a center portion of the substrate  
8 polishing pad.

1 15. The substrate polishing pad of claim 14, wherein the one or more fluid retaining  
2 grooves extend from the center portion of the substrate polishing pad to an edge of the  
3 substrate polishing pad and wherein no point of the grooves is tangent to a radial line  
4 extending from a center to the substrate polishing pad.

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1 16. The substrate polishing pad of claim 14, wherein the grooves are formed on the  
2 mounting surface and the substrate polishing pad comprises perforations extending between  
3 the polishing surface and the mounting surface.

1 17. The substrate polishing pad of claim 14, wherein the substrate polishing pad  
2 comprises polyurethane.

1 18. The substrate polishing pad of claim 14, wherein the substrate polishing pad is  
2 adapted for use with a rotary polisher.

1 19. An apparatus for polishing a substrate, comprising:  
2 (a) one or more rotatable platens;  
3 (b) a motor coupled to the rotatable platens;  
4 (c) one or more polishing heads rotatably mounted in facing relation to the  
5 rotatable platens; and  
6 (d) a polishing pad disposed on each of the rotatable platens,  
7 wherein at least one of the rotatable platens and the polishing pads comprise a  
8 plurality of non-intersecting fluid retaining grooves formed on a first surface thereof and  
9 wherein at least a portion of the grooves are disposed at an angle to a radial line extending  
10 from a center of the first surface and are adapted to flow a fluid inwardly from an outer  
11 portion to a center portion of the first surface.

1 20. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining  
2 grooves comprise a plurality of arcuate grooves extending from the center portion to the  
3 outer portion.

1 21. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining  
2 grooves are selected from the group of arcuate grooves, linear grooves and any combination  
3 thereof.

1 22. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining

2 grooves is selected from the group of:

- 3 (a) arcuate grooves;
- 4 (b) linear grooves disposed in an angular relation to the radial line; and
- 5 (c) a combination of (a) and (b).

1 23. The apparatus of claim 19, wherein the first surface is a platen mounting surface of  
2 the polishing pad in mating abutment with a pad mounting surface of the platen and further  
3 comprising a plurality of holes formed through the polishing pad and coupling the plurality  
4 of non-intersecting fluid retaining grooves with a polishing surface of the polishing pad.

1 24. The apparatus of claim 19, wherein the first surface is a pad mounting surface of the  
2 platen in mating abutment with a platen mounting surface of the polishing pad and further  
3 comprising a plurality of holes formed through the polishing pad and coupling the plurality  
4 of non-intersecting fluid retaining grooves with a polishing surface of the polishing pad.

1 25. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining  
2 grooves is selected from the group of:  
3 (a) arcuate grooves;  
4 (b) linear grooves disposed in non-parallel relation to a radial line extending  
5 from a center of the polishing pad or platen; and  
6 (c) a combination of (a) and (b).

1 26. The apparatus of claim 19, wherein the plurality of non-intersecting fluid retaining  
2 grooves comprise a first portion oriented at a first angle greater than 0 degrees and less than  
3 90 degrees relative to the radial line and a second portion oriented at a second angle greater  
4 than 90 degrees and less than 180 degrees relative to the radial line.

1 27. The apparatus of claim 26, wherein the first and second angles vary along their  
2 respective lengths.

1 28. A rotatable platen for a polishing system, comprising a patterned pad mounting  
2 surface forming a plurality of non-intersecting fluid retaining grooves each having a portion

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3 oriented at an angle relative to a radial line originating at a center of the pad, the portion  
4 adapted to flow a fluid inwardly from a perimeter portion to a center portion of the platen  
5 during rotation of the platen.

1 29. The rotatable platen of claim 28, wherein the plurality of non-intersecting fluid  
2 retaining grooves is selected from the group of:

- 3 (a) arcuate grooves;  
4 (b) linear grooves disposed in angular relation to the radial line; and  
5 (c) a combination of (a) and (b).

1 30. The rotatable platen of claim 28, wherein a polishing pad is mounted on the pad  
2 mounting surface so that the polishing pad and the plurality of non-intersecting fluid  
3 retaining grooves form fluid passageways between the polishing pad and the platen.

1 31. The rotatable platen of claim 28, wherein the rotatable platen is part of a chemical  
2 mechanical polishing system.  
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